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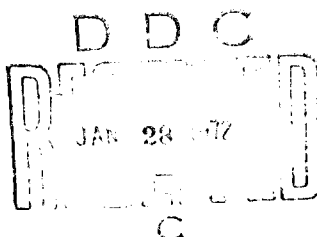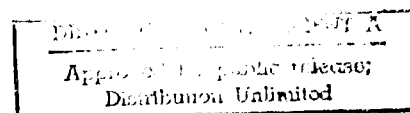
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by

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5 January 1972

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ABSTRACT

This document provides an introduction for document
series TM-4857, A Survey of Digital Signal Processing
Techniques for Speech Analysis.

1.   INTRODUCTION

The analysis of speech characteristically involves the use of digital signal-
processing techniques. Although analog methods are preferred for their
speed, digital techniques can be modified more easily and can be quickly
added to other software packages. Moreover, the computational efficiency of
some digital techniques has increased so substantially over the past several
years that these techniques have become more and more attractive to the re-
searcher. In particular, the rediscovery in 1965 of the so-called Fast
Fourier Transform (FFT) algorithm made the practical computation of the dis-
crete Fourier Transform (DFT) a reality. Using the FFT algorithm and various
properties of the DFT, it was later shown that autocorrelation functions, con-
volutions, and digital filters could be calculated efficiently. More recent
interesting applications of the FFT have been directed to the problems of
pitch detection and formant analysis of voiced speech.

Ir this document series we shall present different FFT algorithms and contrast
them with respect to computation time, accuracy, storage requirements, and
other restrictions. In addition, various applications of the FFT will be
given, along with sample test cases. Complete FORTRAN codes will accompany
the discussions. As new algorithms are developed, they will be tested as
above, and the results will be published in future volumes in this series.

The objective is non-tutorial insofar as the description of the algorithms is
concerned. Rather, this series will provide a clearinghouse for the algorithms
so that each can be similarly tested and evaluated and the best can be chosen
objectively.